

# BIOFUEL PRODUCTION: IMPLICATIONS FOR GRAIN INDUSTRY AND CONSUMERS

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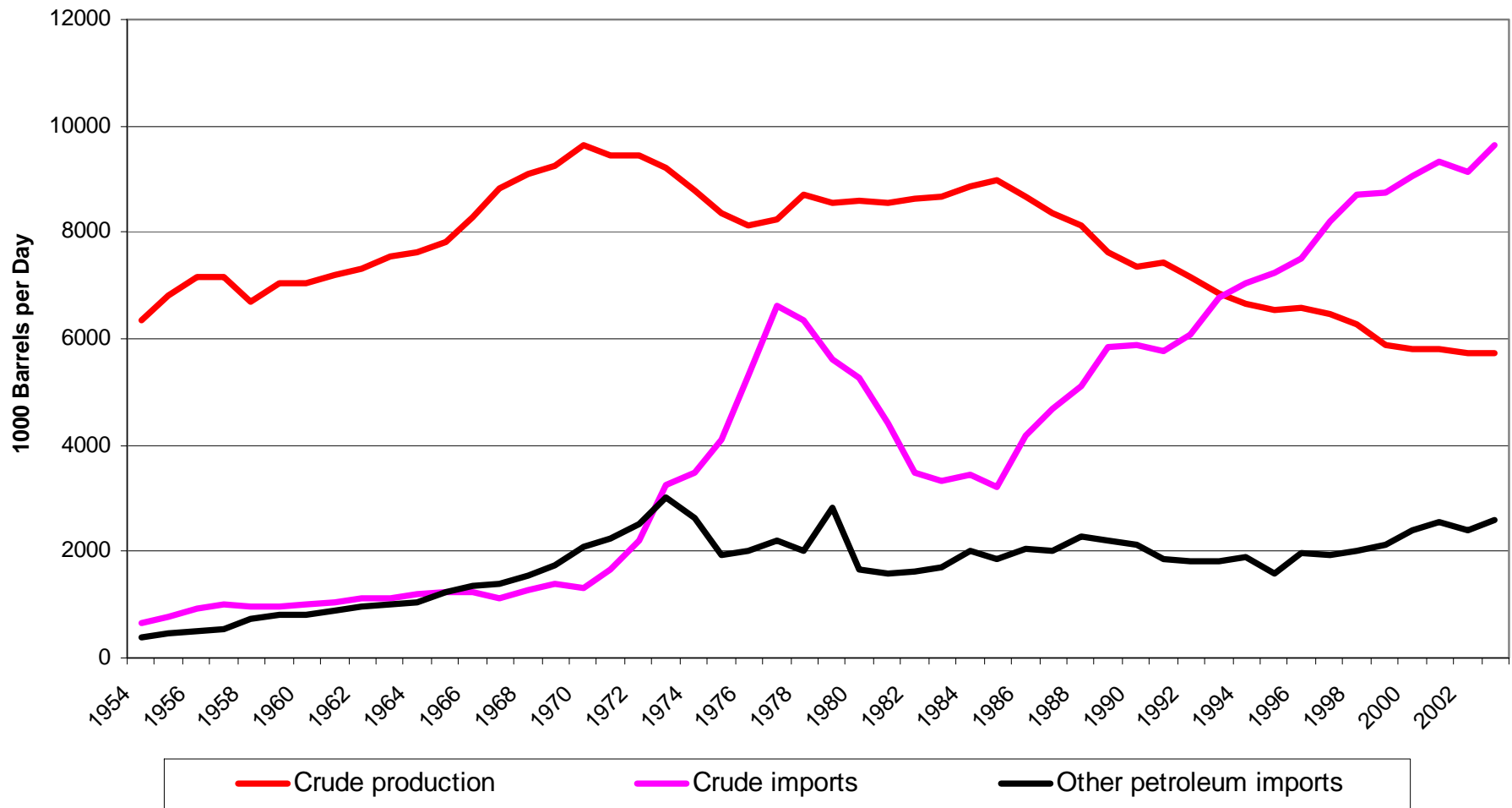
# INTRODUCTION

- In the United States and many countries in the world, ethanol is used as a gasoline additive, not as a fuel. The only exception is Brazil
- Prices of ethanol, crude oil, and petroleum refined products, such as gasoline and methyl tertiary butyl ether (MTBE) are subsidized
- Gasoline and MTBE prices do not reflect the external costs of burning fuel such as the effect on health and environment

# Why Ethanol?

- Ethanol is mostly produced in countries that have surplus of agricultural commodities, high greenhouse gas emissions (GHG), and high dependency on imported oil
- Examples are grains and oilseeds in the United States; sugar cane and oilseeds in Brazil; grains, oilseeds, sugar beets, and wine in European Unions; sugar cane in India; and grains in China

# U.S. Crude Oil Production vs. Imports, 1954-2003



Source: EIA/DOE

# OVERVIEW

- Industry at a Glance
- Markets for Biofuel
- Biofuel Supplies
- Projected Ethanol Production
- Implications for:
  - Grain industry
  - Consumers

# Industry at a Glance--Ethanol

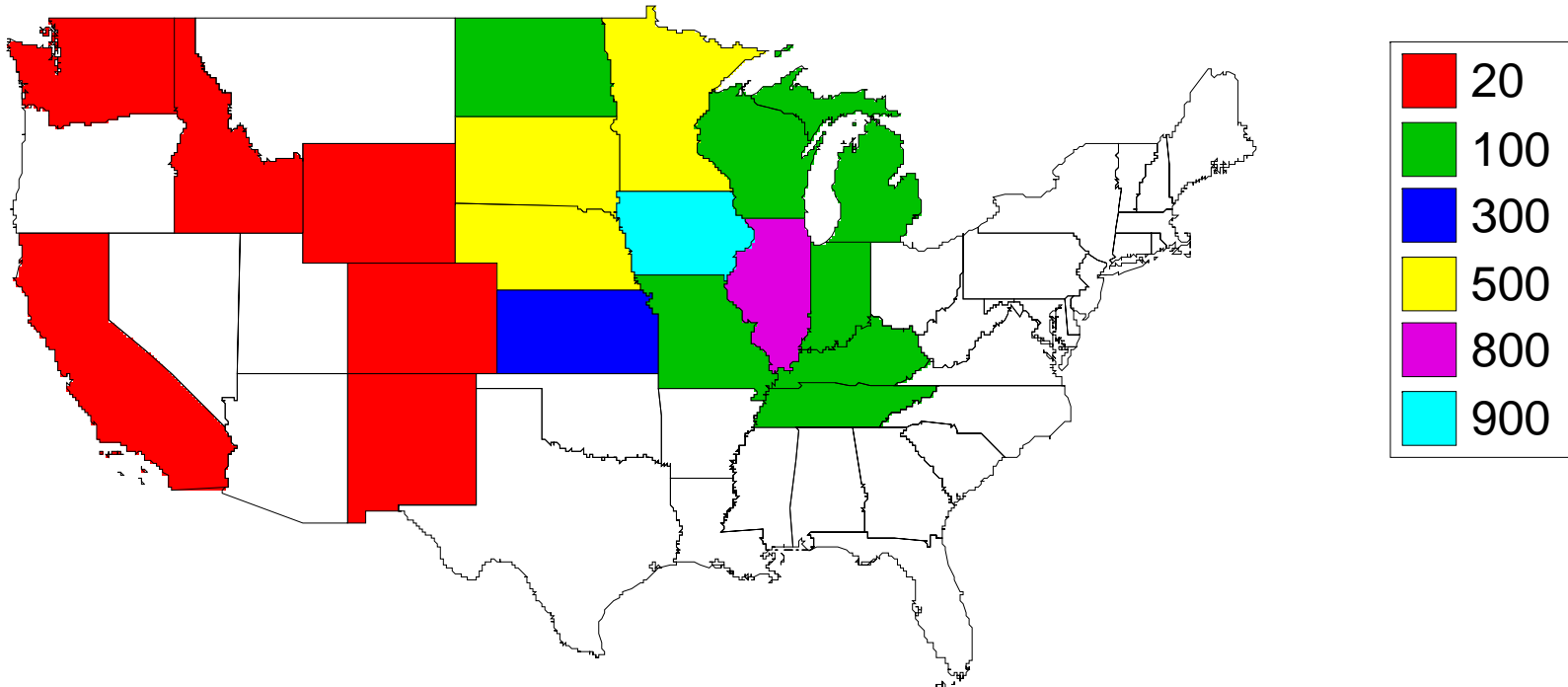
- Number of operating ethanol plants, 83
- Plants under construction or expansion, 16
- Current production capacity, about 3,600 million gallons per year (MGPY)
- 2004 production, about 3,400 MG
- Projected production capacity, 4,400 MGPY by late 2005
- Size, less than 1 to over 300 MGPY
- Location, 20 States
- Process, wet and dry
- Feedstock %:

Corn	97
Sorghum	2
Waste	1

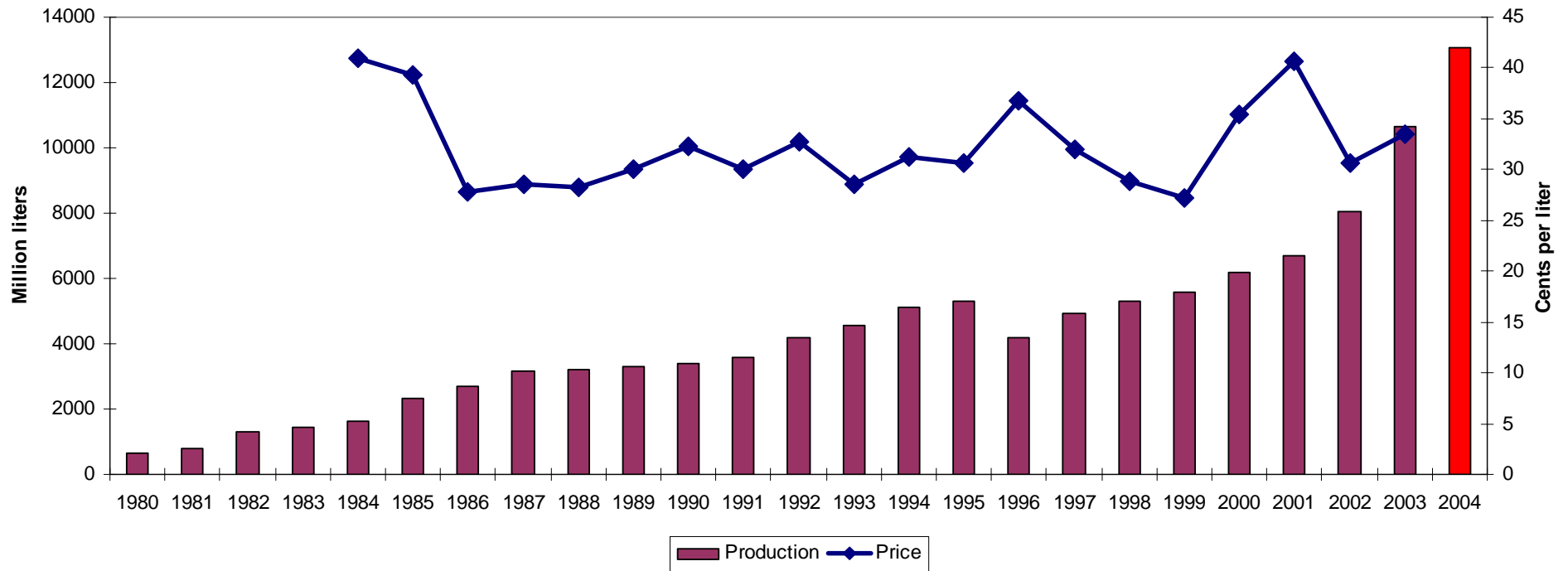


## U.S. Ethanol Production Capacity

Million gallons per year, 2004



## U.S. Ethanol Production and Prices, 1980-04





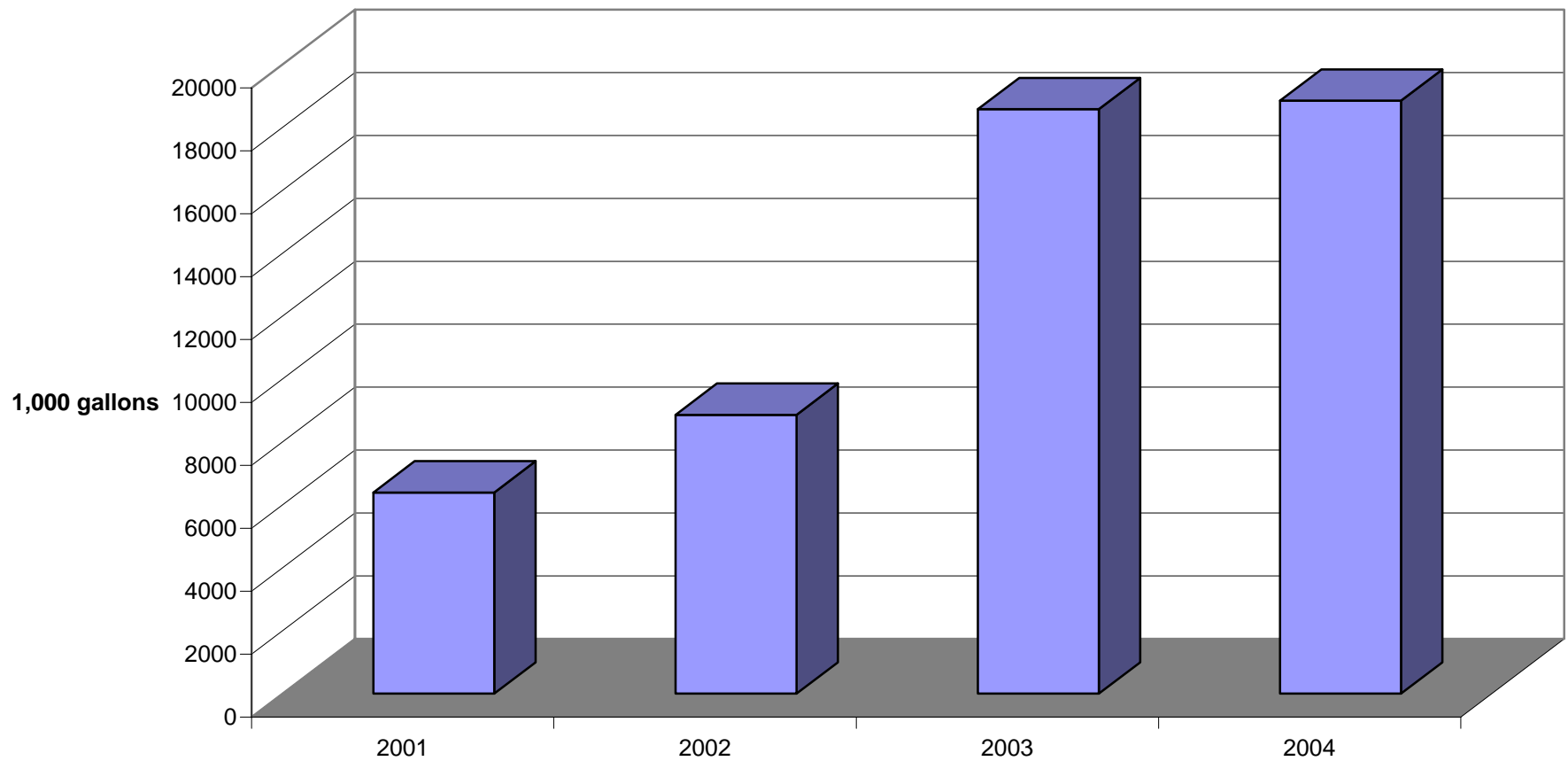
# Industry at a Glance--Biodiesel

- Number of operating biodiesel plants, 20
- Plants under construction or expansion, 10
- Current production capacity, about 150 million gallons per year (MGPY)
- 2004 production, less than 30 MG
- Projected production capacity, 200-400 MGPY
- Size, less than 1 to 30 MGPY
- Feedstock %:

Soybean oil	90
Animal fats & yellow grease	10
- Biodiesel could be used as a neat fuel (B100) or could be blended with petroleum diesel fuel from 1 to 20 percent (B1-B20)



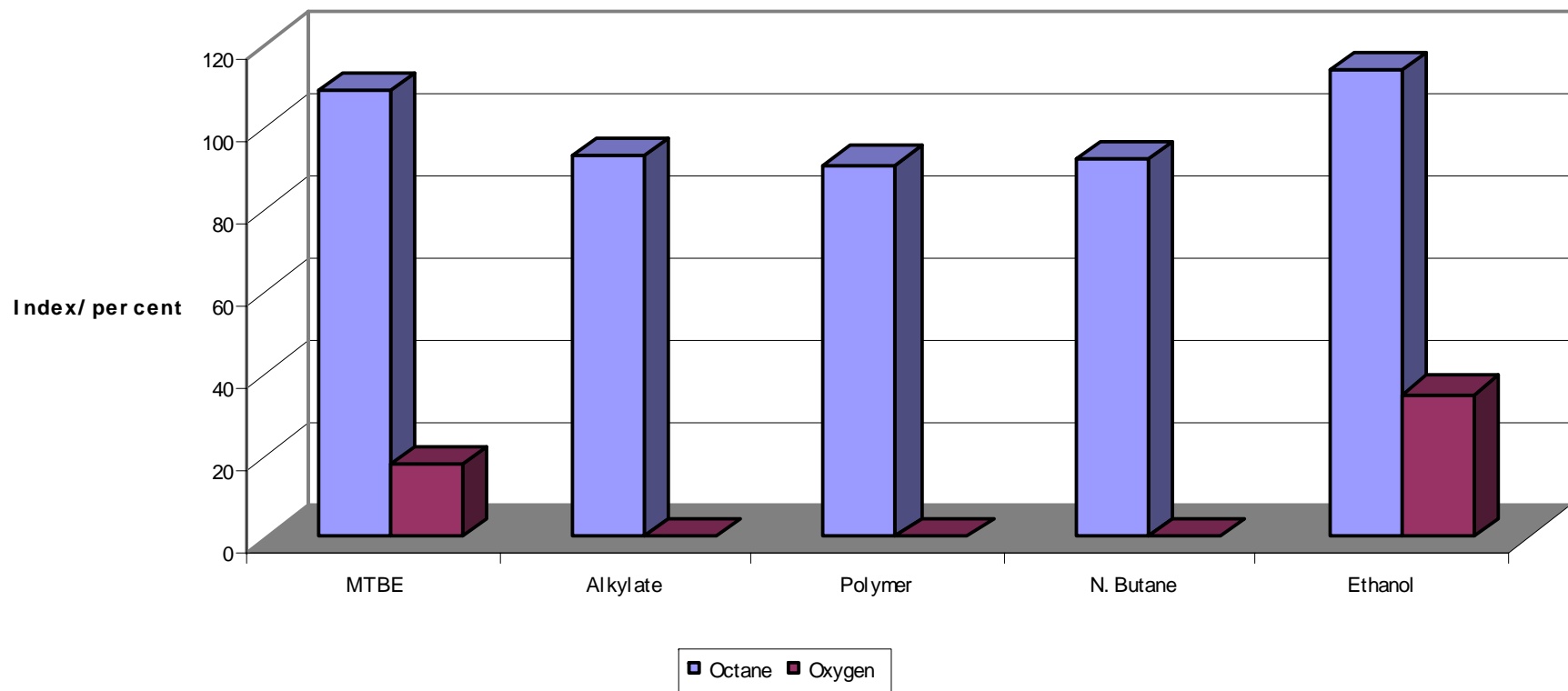
# Bioenergy Program: Biodiesel Production



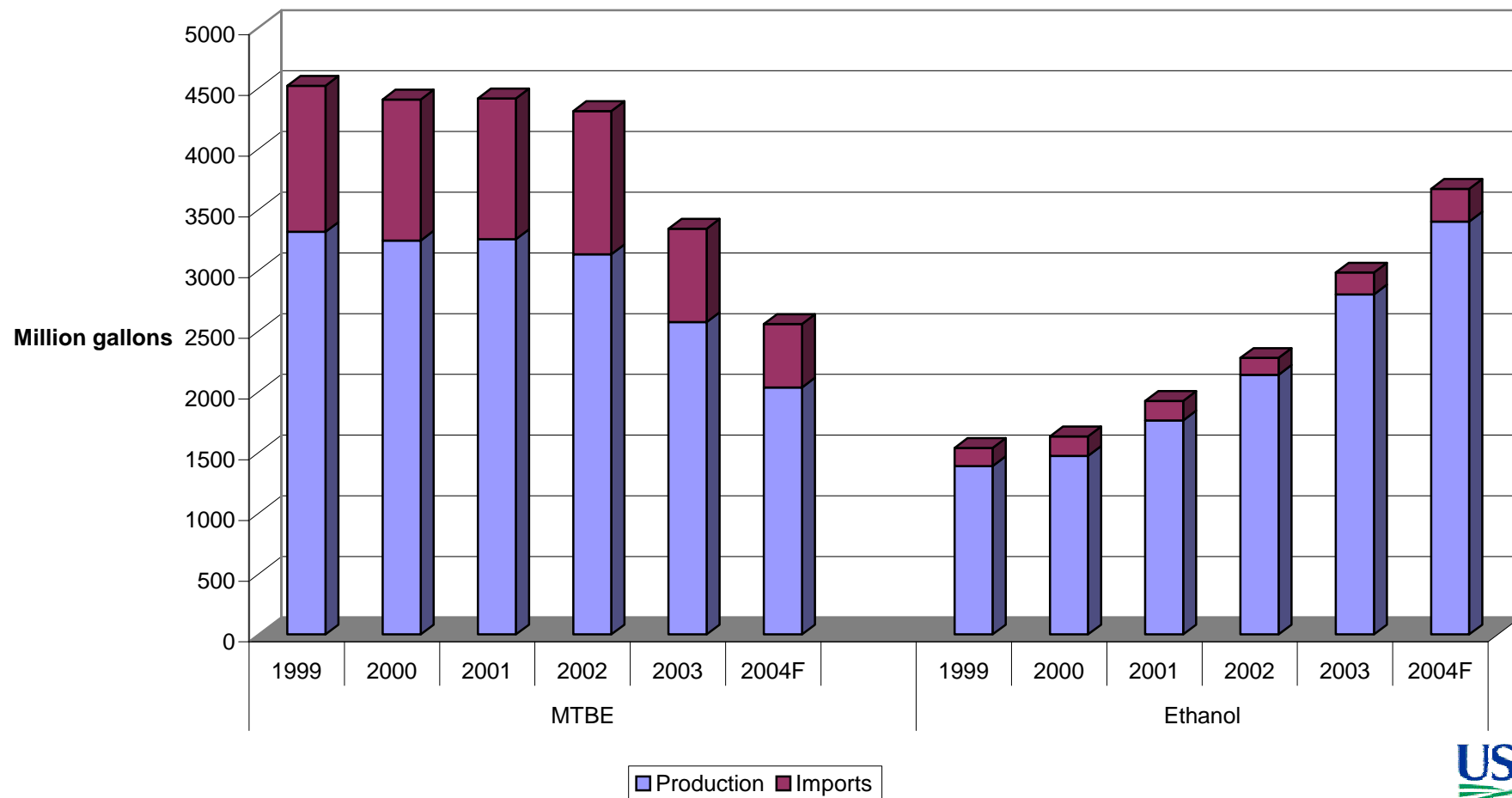
# Markets for Biofuel

- Fuel additives:
  - Oxygen: Federal winter oxygenated fuels, Federal reformulated gasoline, and Minnesota ethanol program
  - Octane
  - Lubricant
- Fuel
- Export

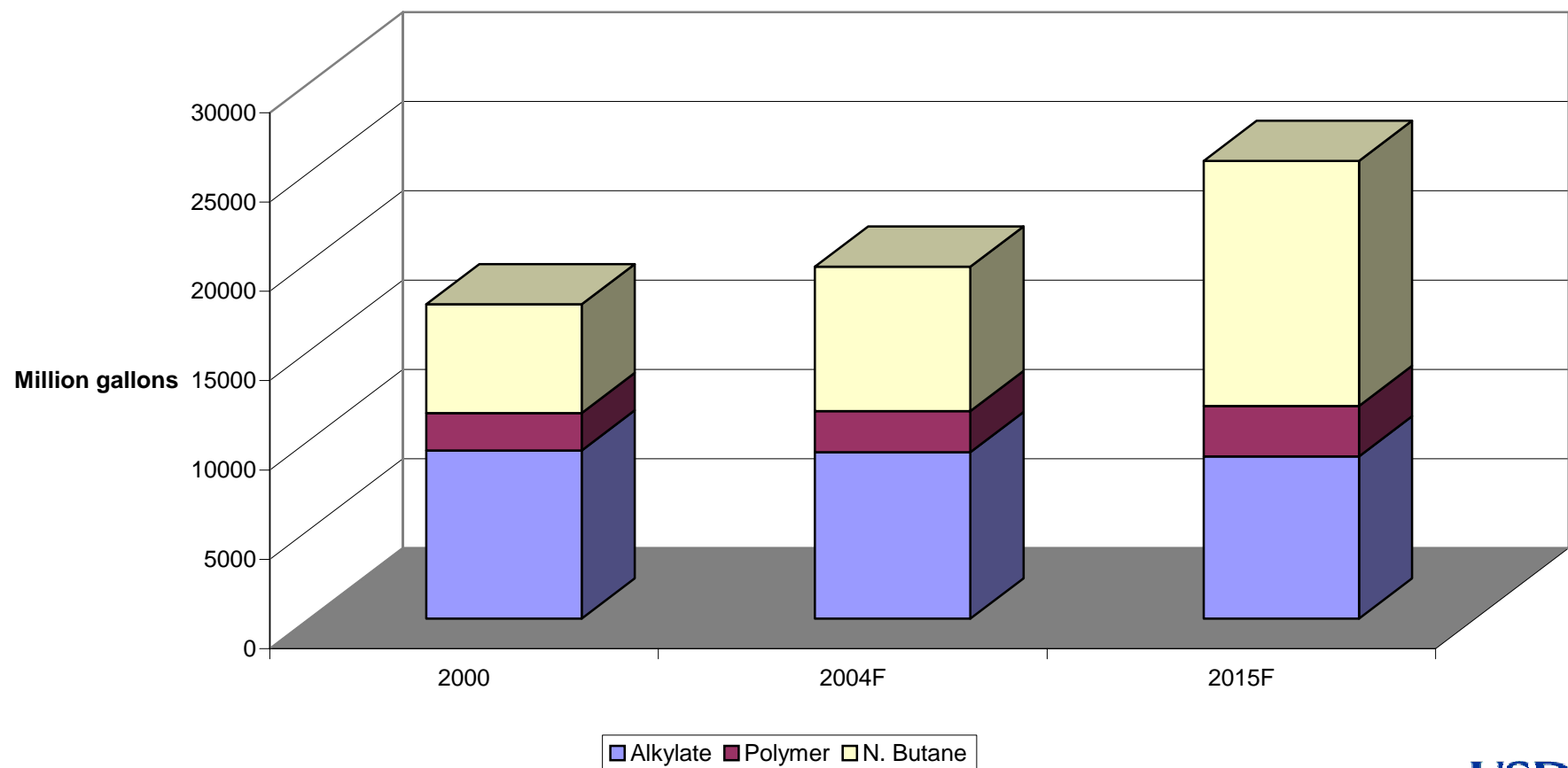
# Gasoline Additives: Octane and Oxygen



# MTBE and Ethanol Production and Imports, 1999-2004



# Gasoline Additives for Octane, 2000-2015

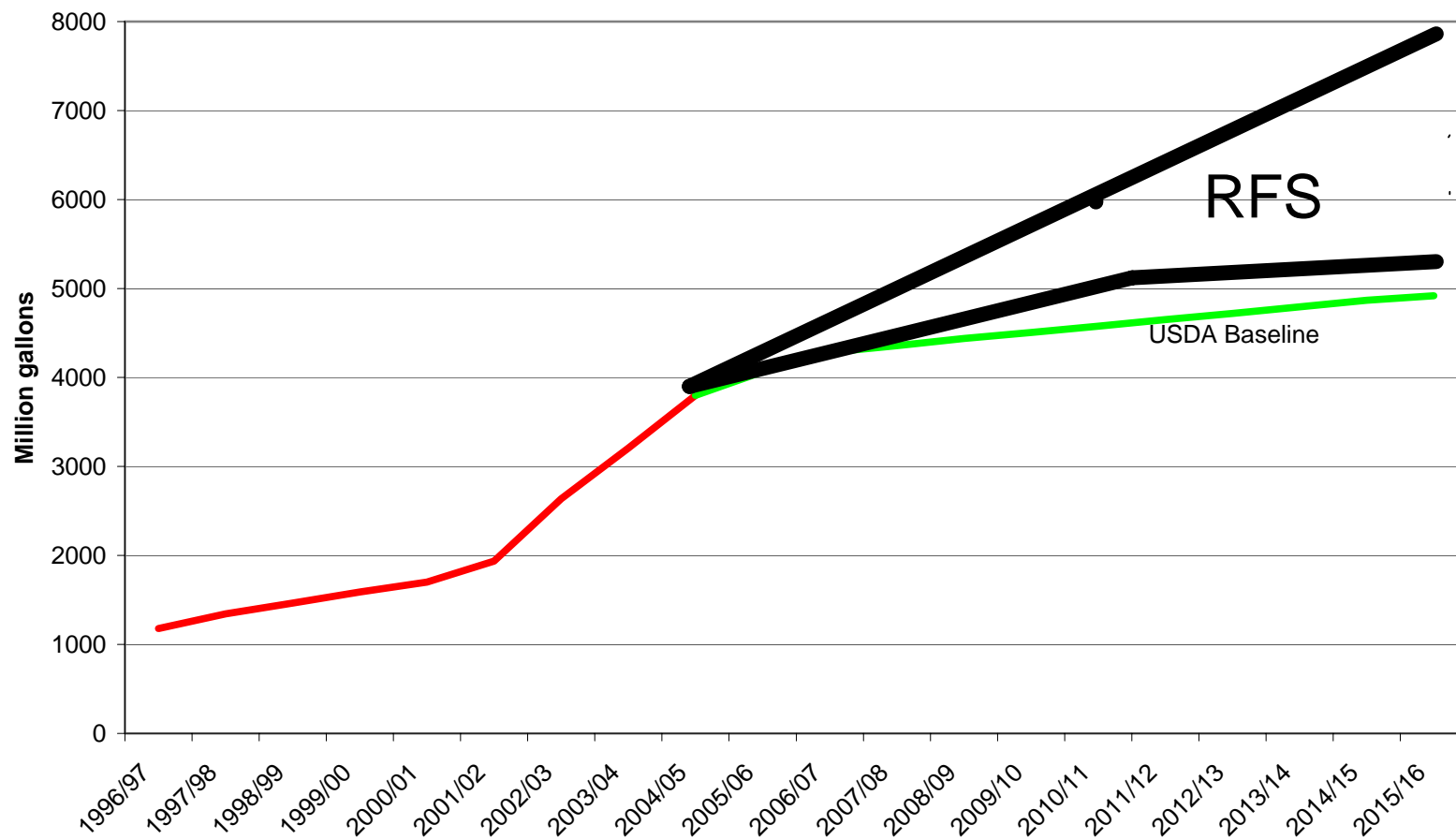


# Supply of Biofuels

- Directly related to:
  - Policies and regulations
  - Expected demand
  - Prices of feedstock--corn, sorghum, soy oil
  - Annual production capacity
  - Incentives--Federal, States, USDA
  - World crude oil prices and U.S. gasoline and diesel fuel prices

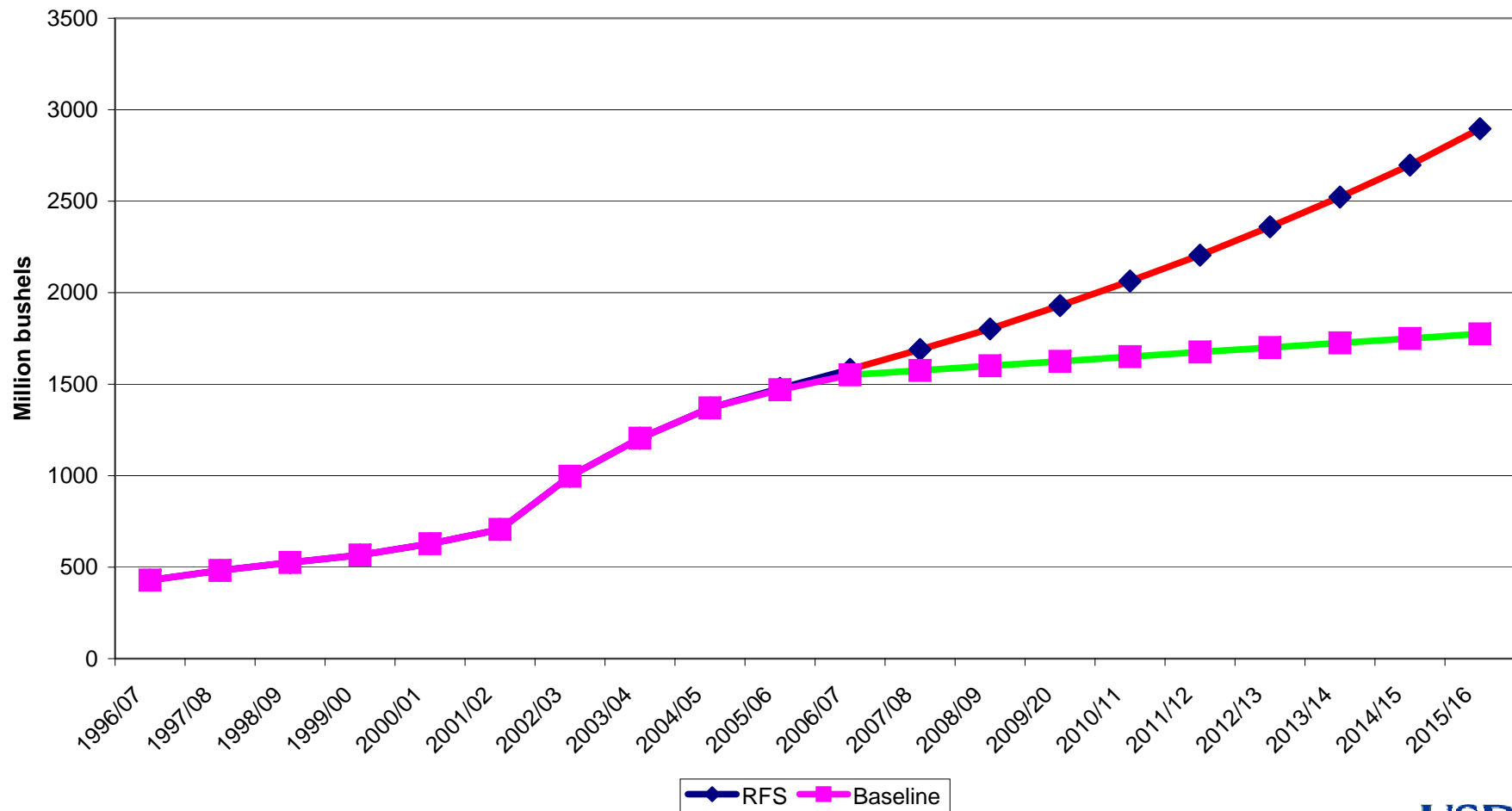


# Ethanol Production: 1996-2015

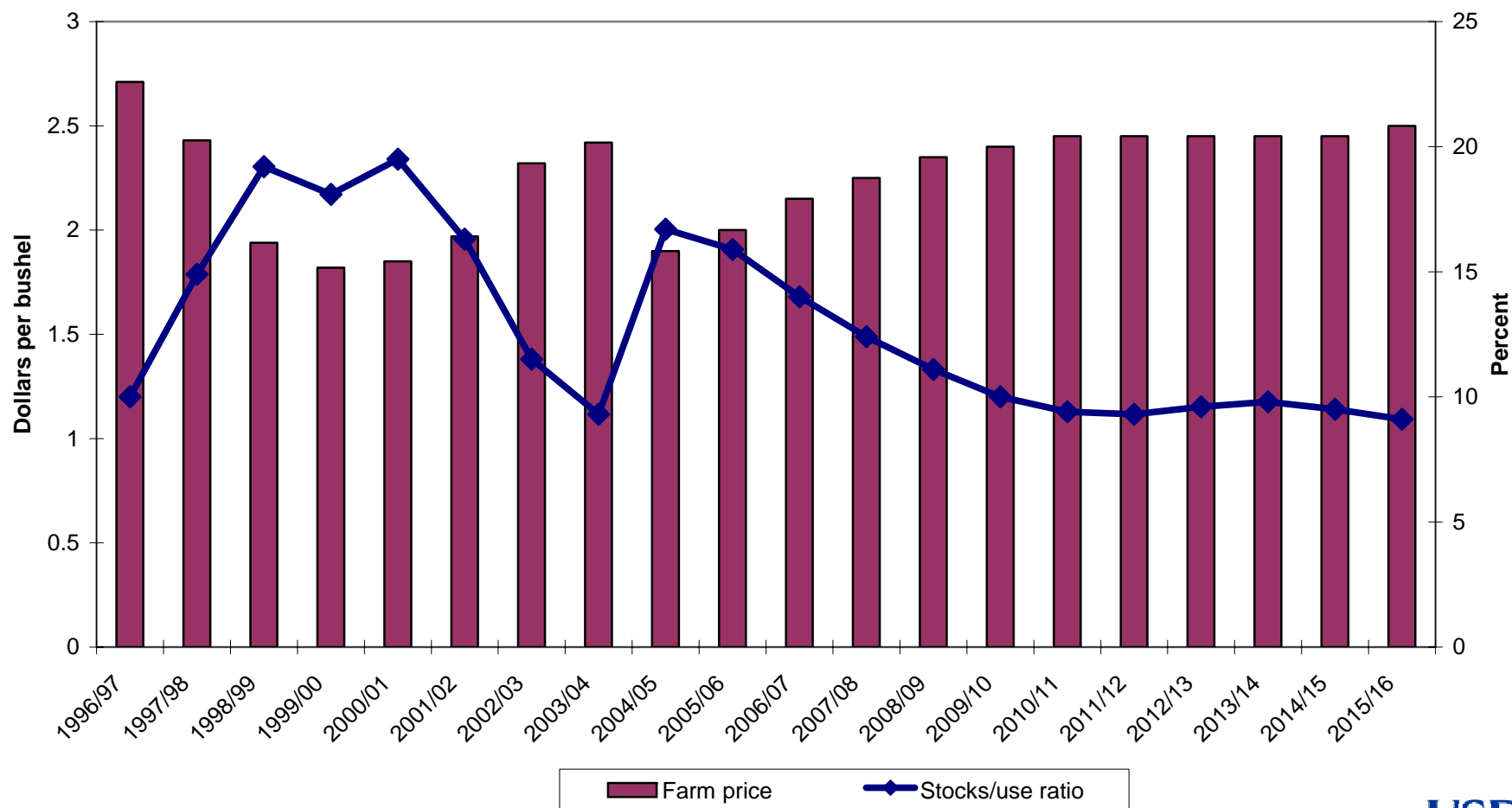




# Projected Corn Use for Ethanol: Baseline and Renewable Fuels Standard (RFS)



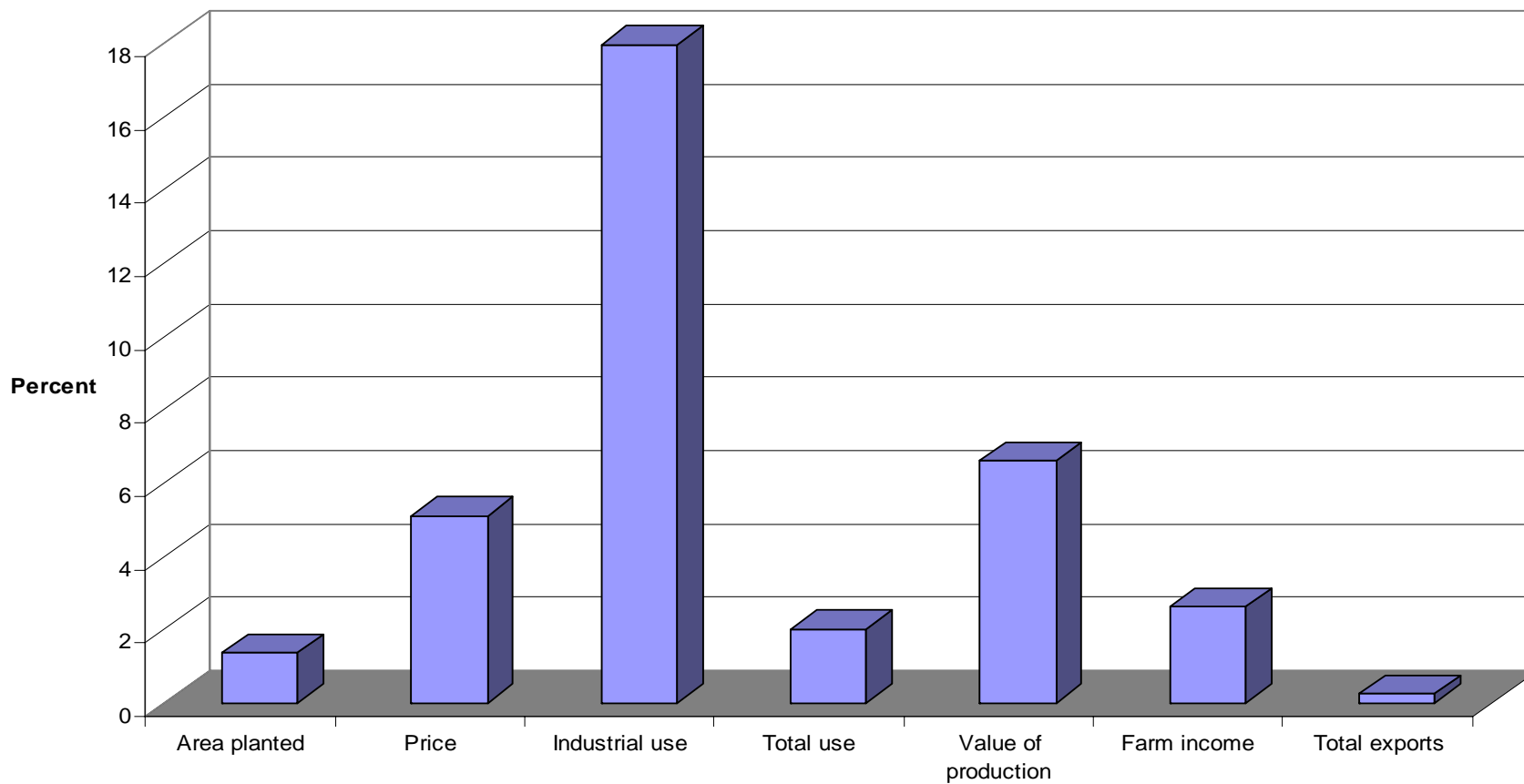
# Corn: Farm Prices and Stocks/Use Ratio, 1996-2015



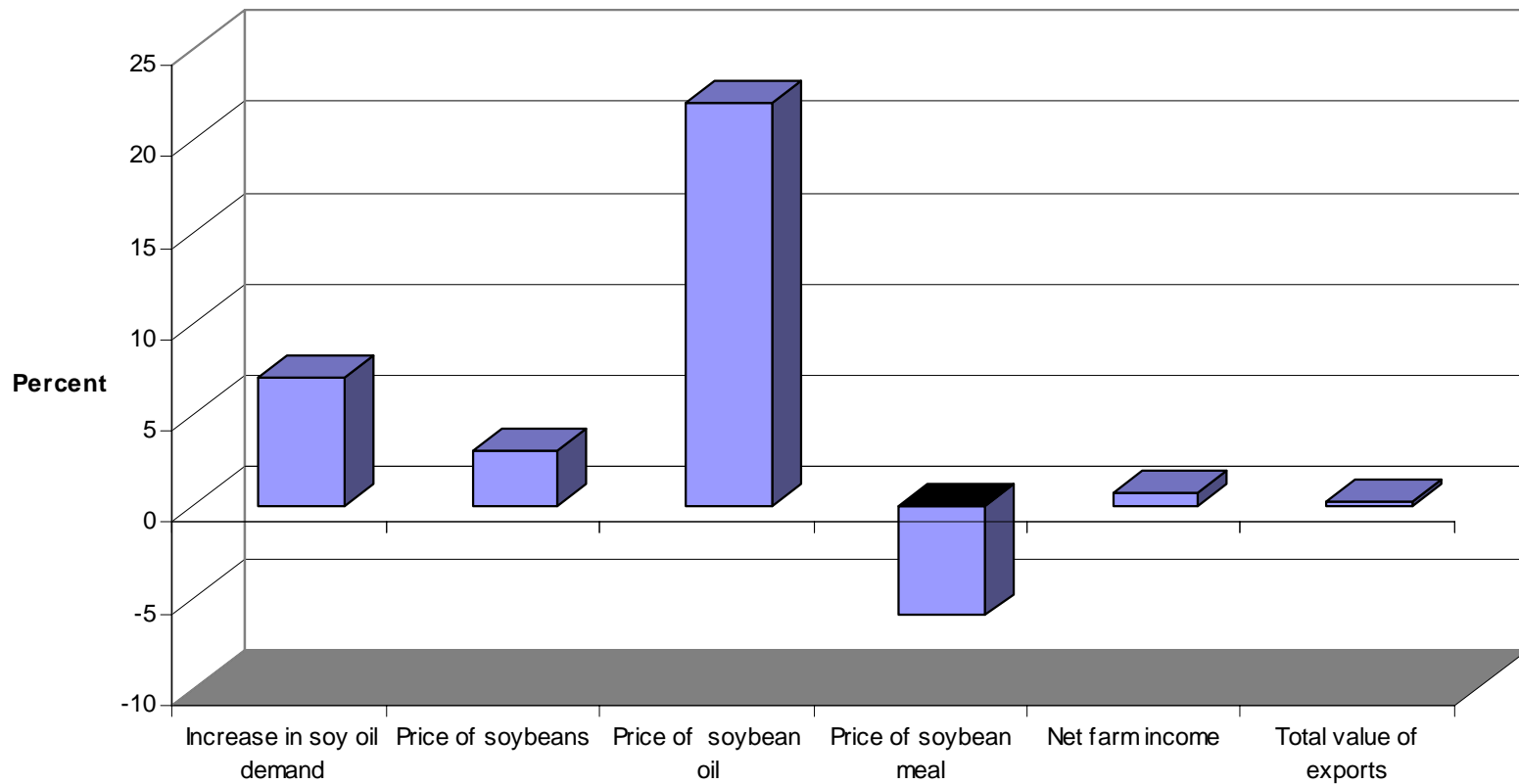
# Implications for Grain Industry

- Reduces agricultural surplus and increases commodity prices
- Increases farm income
- Creates job
- Improves trade deficit

## Economic Impacts of Increasing Corn-Ethanol Production by 1.4 Billion Gallons in 2012



## Economic Impacts from an Increase in Demand of 1.9 Billion lbs of Soybean Oil by 2012



# Implications for Consumers

- Ethanol production reduces tailpipe and other toxic emissions and improves the air quality
- Cleaner air reduces diseases, such as asthma and respiratory system, associated with breathing of polluted air
- Replacing MTBE with ethanol eliminates the surface and ground water contamination
- Ethanol production indirectly lowers the prices of gasoline to consumers
- Without presence of ethanol in our Nation's energy supply, our foreign dependency and domestic prices would be much higher

# Co-product Supplies, 2004

- Distillers dried grains (DDG), 7 to 8 million tons
- Corn gluten feed, about 3 million tons
- Corn gluten meal, 0.6 million tons
- Corn oil, about 0.4 million tons
- CO<sub>2</sub>

# Future Technologies

- Zecham process, Fischer-Tropsch (FT) process, nano filtration, and ultrasound wave, and pulverized air dryer (PAD)
- New dry-milling process--separating fiber and corn germ from DDG, removing phosphate from DDG
- Conversion of corn fiber and corn stover to chemicals, biobased products, and fuel



# CONCLUSIONS

- Biofuel production will continue to grow in the United States
- Biofuel production will lower grain and oilseed surpluses
- Biofuel production increases commodity prices and farm income
- Biofuel production and use reduce greenhouse gas emissions and improve air quality and reduce diseases associated with breathing of polluted air